

A NEW
ANALYSIS
OF THE
BRISTOL WATERS:

Together with the

CAUSE
OF THE
DIABETES and HECTIC.

And their Cure, as it results from those
WATERS, experimentally consider'd.

By JOHN SHEBBEARE, Chemist.

*Fronte sub adversa scopulis pendentibus antrum:
Intus aquæ dulces.* ——— VIRG. *Æneis.*

L O N D O N :

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THE NEW
ANALYSIS

OF THE

BRISTOL WATER

By J. G. GARRARD, Esq.

ANALYSIS

OF THE

DIARRHEA AND HÆMORRHOID

All the Cases are it is said from those
of the same kind, and are considered.

By JOHN GARRARD, Esq.

Printed by J. G. GARRARD, Esq.
Vinegar Lane, London.

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CITY of BRISTOL.

You will excuse me, if thro' this
 Account of the Diabetes, &c. I in-

cline to my Profession. Every Man
 has some Bias, and the Business in

GENTLEMEN,
THE Reason of my undertaking
 the following Analysis, will be

plainly enough seen in the Introduc-
 tion; but whether I have succeeded or

fail'd in my Account of the *Diabetes*
 and it's Cure, as it arises from the

Bristol Waters, is left entirely to your
 Determination.

A 2 It

It has never once enter'd into my Imagination, that those Waters will more effectually cure a *Diabetes* and *Hætic* now than heretofore, or any great Advantage accrue to Mankind from this Account; yet it has ever been agreeable to find the Theory of any Science, corresponding to the Facts arising from the Practice of it.

You will excuse me, if thro' this Account of the *Diabetes*, &c. I incline to my Profession. Every Man has some Bias, and the Business in which he is most engag'd is naturally most apt to draw him.

There was a time you perfectly well know, when almost every thing in *Phyfic* was accounted for from *Chemical Principles*. There was also, when every Disease and the Cure of it,

it, was reduced to Mathematical and Hydrostatical Accounts: And all these in their different Turns have disappear'd; and Observation and the History of Diseases have again succeeded.

But methinks there is a Degree of Truth annex'd to every Manner of accounting for Disorders, tho' not an absolute one, and they seem to be mostly false, only when they deny a Truth to each other. Anatomy will discover to us, that the Arteries and Veins contain what we call Blood, but what that Fluid is, and what Alterations arise in it from different Degrees of Heat, and the Addition of different Medicines, Chemistry alone can inform us. It informs us also experimentally, whether our Secretions, some of them, are perfectly secreted

or not. And tho' we cannot venture to ascertain, that because such and such Phenomena arise from the Mixture of different Medicines with the Animal Fluids, apart from the Body, that they will be similar there to, when within the Laws of Circulation; yet we must not altogether dispise the *Experimental* and *Analogical* Manner of reasoning; since we very often see that very fatal Consequences are brought on by Medicine, and very probably too in the same Manner within us, as without, in the Experiments. It would be as ridiculous, just, as if we should condemn the Advantages accruing from Numbers because we cannot attain to Infinity.

Whatever has been said here in the Chemical Hypothesis, may be said with equal Truth in another View of
the

the Mathematical and Hydrostatical
Account.

It may perhaps seem at first Sight that the Situation of the Well is too poetically described, for any thing in which Physic is concern'd; but I imagine when it is consider'd that it was design'd as a Picture, and as it relieves the Mind from the Dryness of the Experiments, such a Liberty may be allow'd me; especially since when the Description ends, that kind of Stile is no longer continued.

If this Essay should have the good Fortune of being liked by you, it will amply reward the Care I took in the Experimental Part; where to be just was my strictest Endeavour, as it shall always be in preparing those Medicines which may come under your Administration:

Administration. And for those Reasons, that every Physician may receive the due Honour of a just Prescription, and every Patient the true Effect of a good Medicine.

I am,

GENTLEMEN,

Your most obedient Servant,

no longer continued.

J. SHEBBEARE.

INTRO-



THE INTRODUCTION.

IT is more than a Year since I began a Course of Experiments on the *Bristol Waters*; but upon knowing that Dr Keir had undertaken the Analysis, I immediately stopt my Enquiry, and awaited his Publication, in Expectation of something quite accurate and satisfactory. Upon perusal of his Book I found my self disappointed, and continu'd my Experiments for these Reasons.

First, because I see no Account for the Heat and other Phænomena of the Waters.

Next, I apprehend the Conclusions drawn from his Experiments are not just.

B

And

And lastly, If the Waters do contain what the Doctor affirms, they will ever be irreconcilable with the Cure of a *Diabetes*.

I think then, there needs no Apology for an Enquiry of this Kind. It rather becomes necessary that some other should be made which may bring the Rationale and Practice of those Waters to coincide, and satisfy the Patient of the Truth of some Principles, upon which he may ground his Expectation of a Cure. Now let us suppose they contain *Nitre* and *Limestone Powder* with an exceeding subtle Spirit. Is there in this City any Physician that would heartily prescribe these Waters: Or any distant Physician that would send a Patient to a Mineral either trifling, inefficacious, or of a Nature quite opposite the Cure? If then this should be the Event, which is not unlikely, it will be fatal to the Health, if not Lives, of great Numbers.

As the following Experiments are of my own making, I can the better answer for the Truth of the Facts. There has been no Accuracy wanting in discovering the Contents of the Waters, and ascertaining them from Phænomena quite definitive. I have produced also analogous Appearances by different Experiments, with Conjectures of their Causes;

(3)

Causes; then having consider'd the Source of a *Diabetes*, I shew the Effects of those Contents on animal Solids and Fluids as they produce the Cure.

Whatever Contradictions may be found in this Analysis to that of Dr *Keir*, they must not be understood to arise from any Inclination I have to contradict, but from the Truth of the Examination. And where that is the Supposition every Man will be satisfied with it, however contrary to his Sentiments.



THE



THE
SITUATION
OF THE
HOT-WELL.

THE Situation of the *Hot-Well* is as picturesque perhaps as can be imagin'd; it lies on the Side of the River *Avon*, about a Mile and half distant from the City of *Bristol*. The Stream issues from a very high Clift of Lime Rock, perhaps two hundred Feet below the Summit, and ten above the Level of Low Water, but as the Water rises here in the lowest Tides thirty Feet, and in the Spring much more, it was of Necessity render'd inaccessible some hours every Day, till Mr *Padmore*, (a Man well known for his Genius

Genius in Mechanics) inclos'd it with a Cistern, and affixed Pumps to the Spring, by means of these the Stream is elevated almost thirty Feet in all its native Heat, Purity, and Perfection: Notwithstanding this Care the River Water, when it rises above the Spring, mixes with the Medicinal and renders it unfit for Use; this is perfectly well known by those that pump at the Well, and consequently as soon as perceived they abstain till it recovers its former Purity.

The River *Avon* flows here till it falls into the *Severn* Sea, between two Cliffs, in some Places vastly high, craggy and overhanging, in others perpendicular or gently sloping; here cover'd with Woods and flowering Shrubs, of all the different Shades of Green, fill'd with Music of our Singing Birds; There gloomy and obscure, contrasted by strong Lights, and various Colours of the Marble Rocks, which are as variegated as the foreign, and admit as beautiful a Polish. Add to this the flowing of the Tide which enhances the Beauty, by bringing Vessels of every Kind close to the Windows of the *Water-Room*, and compleats as agreeable Landscape as can be seen any where. And as the Mind and Body reciprocally affect each other, how proper an Entertainment is it for the Imaginations of Men indisposed,

posed, and how Salutary an Avocation to those Thoughts which every *Valetudinarian* is too apt to indulge? Hence it is in some greater degree conducive to Health, than Places altogether void of these Amusements.

On the Summit of the Rocks there formerly stood a Chapel, dedicated to St *Vincent*, it is equally uncertain whether he was canonized for the Discovery of the Medicinal Spring, and the Cures thence resulting to Mankind, or from clearing the River of huge Rocks that distress'd the Sailors in their Navigation near this Place. Whatever was the Cause, he constantly received their Vows for safety as their tutelar Saint, and was of no small Distinction.

The *Downs* which are on a Level with the Cliffs are of a dry healthy Soil, and much frequented by Company; they are open to the reviving Breezes of the Sea, which refresh them every Summer's Day. Here too you may adapt your Prospects and Situation to every Humour, whither you chuse to be conceal'd beneath the Shade of Rocks and Woods, reclin'd beside some murmuring Rivulet, which naturally return our Thoughts upon ourselves; or whether you prefer the exalted Situation, where the Mind widens with the View into Benevolence and good Wishes.

Wishes. That Prospects have a kind of Moral Effect on the Thought I presume no one will deny, since Light and Colours are to the Eye, what Sound and Harmony is to the Ear. Hence too it was that the Temples of the ancient Deities were situated according to their Attributes: That of *Pluto* in a Cavern all sad and gloomy, by the Side of rumbling Waters; whilst that of the Muses was placed on the Point of *Parnassus* all gay and enlivening; perhaps the most elevated Eminence of this Cliff was made the Seat of *St Vincent's* Chapel, because his Beneficence was more extensive than that of other Men.

The essential Difference of the Air in this Place, from most other dry and elevated Situations is, that it has but little, if any, of that *vague Acid*, so generally dispersed thro' the Earth, which in some Places is even deadly, as at the Grotto *Dei Cani* in *Italy*. We may be assured of this from the Nature of the Waters and Fossils in both, which, an Alcalescence prevails. Now every thing offensive in the Atmosphere must arise from Exhalation, but it is scarce probable that there are any acid Effluvia here, because if the acid was in any Quantity there must be more Salts found in the Water, since it is evident there is no want of Limestone: Now Limestone and a mineral Acid for ever produce

duce Alum, and consequently as there is little Alum found here, the Air must be void of acid Effluvia: Notwithstanding this this great Advantage, it must not be thought that this Air is agreeable to every Indispotion, it can be of Service to none but those of a cold pituitous nervous Habit, and detrimental to all whose Juices tend to Alcalescence and Putrefaction from a sanguine Constitution.

The Lodging-Houses are neat and well situated, having a pleasant Prospect, and as they are near a large City 'tis easy to be provided with every Necessary: Here are Baths too, both private and well contriv'd, and a *Long Room* with the usual Diversions attending such Places.

It seems but of little Significancy to determine the Quantity of Water discharged in any certain Time, because it conduces nothing towards an Account of it's Properties, and since there is more wasted than used, notwithstanding the great Demand for it. But should there be any one curious enough to enquire, he may be satisfied by the following Experiment: it has been experimentally found by Monsieur *Mariotte*, that Water flowing from the Surface of a Pool thro' a Hole an Inch square, and always full, runs
off

off thirty Cubic Feet in an Hour, *Paris Measure.* Upon this Experiment having taken the mean Proportion of the Depth of the Stream, where it runs out over the Rock, it may be nearly known how many square Inches it contains, and consequently what Aperture it would pass through naturally; then considering that the Contents of Circles are to each other as the Squares of their Diameters, the whole Discharge in one Hour may be pretty justly known.

How long this Medicinal Water has been prescribed by Physicians, for those Maladies it is now so deservedly esteem'd to cure, is uncertain. We know however, that they have been administer'd with great Success, and their Character much heighten'd by the present Physicians of *Bristol*.



EXPERIMENTS ON THE BRISTOL WATER.

TH E more accurately to distinguish the Genus of the Waters, I shall consider the Phenomena as they naturally appear. The first of which are its sparkling and whiteness in the Glass. Upon growing cold this whiteness disappears, and is precipitated to the Bottom of the Bottle in white Flakes, after being kept some Time.

Experiment I.

To the Bottom of a Glass, by means of some Wax, having fix'd a Thermometer *, it was pump'd on till the Spirits rose to the utmost from the Heat, upon Examination it was found to the Heat of Health as Seventy-seven is to Ninety-four, the Heat of the Atmosphere being at that Time Fifty-two.

Experiment

* The Thermometer was of *Farenheit's* Contrivance, and measur'd from Iceland Cold to Hot by a Scale of 112 Degrees.

(II)

Experiment II.

To a Glass of the Water recent from the Spring was poured Syrup of Violets, and it became green; with a Solution of Silver in Aqua fortis, Sugar of Lead in common Water, Oil of Tartar *per Deliquium*, it turn'd milky and precipitated. Quicksilver dissolv'd in strong Spirit of Nitre, turn'd yellow with the Hot-Well Water; with a Solution of Sublimate in Water, Spirit of Hartshorn, and Tincture of Steel, the Water continued transparent. With Oil of Vitriol a brisk Agitation and Effervescence arose, with Galls no Difference.

Experiment III.

In order to know whether there were any Spirits escap'd from the Waters in cooling, I fix'd a Receiver to a Retort, and well luted the Juncture; then thro' a Hole made in the Crown of the Retort, by a Glass Funnel the Retort was fill'd with Water as it ran warm from the Spring; the Hole then being stop'd, I waited to see if there would any Spirit come over into the Receiver: In all the cooling there appear'd not the least Evaporation or Dew, and if there was any, it

escaped like Light thro' the Pores of the Glass, a Thing scarce credible.

Experiment IV.

The *Bristol* Water examin'd statically, and compared with Rain Water receiv'd very pure on an Eminence, scarce differ'd from it in weight, it was ten Grains in a Pint lighter than common Spring Water.

Experiment V.

Having distill'd five Gallons of *Bristol* Water from a clean Glass Retort, in a gentle Heat of Sand, there remain'd 280 Grains of a whitish Salt Powder, and consequently 7 Grains to a Pint, now a Pint containing $28\frac{2}{3}$ Cubic Inches, and a Cubic Inch weighing $253\frac{2}{3}$ Grains nearly, the Water is to the Residuum as 7310 to 7, or 1044 $\frac{1}{2}$ to 1.

Experiment VI.

Two Drams of the Remains being dissolved in Water and filter'd, the Salt was found after Evaporation, to the Earth as eleven to thirteen, with another Solution of the Remains after Filtration, all the Experiments were repeated that were made by different *Menstrua* at the Well. The Difference

ference was, that Syrup of Violets did not turn green, nor the Solution of Mercury yellow, but Spirits of Hartshorn became milky, and Oil of Vitriol discover'd no Effervescence.

Experiment VII.

Another Part of the filter'd Solution was evaporated till a Pellicle appear'd, and then was placed in a cold Cellar that the Salts might shoot: After a few Days the Glass was cover'd with Crystals, which being examin'd by a Microscope appear'd octogonal, interspersed with cubical ones.

Experiment VIII.

Having separated the octogonal Crystals from the Square, I put them in a Crucible on the Fire, at first they melted, then dry'd and blister'd, and became white, after taking off the Crucible there appear'd a light spongy Substance, acrid to the Taste.

Experiment IX.

The Salts obtain'd from an Evaporation of the filter'd Solution were put into a very small Retort, and then pouring Oil of Vitriol on them, the Receiver was immediatly fix'd
and

and luted, and both placed in a Sand-Heat; upon the gradual Application of Fire, there ascended a white Fume, and a genuine Spirit of Salt came over into the Receiver.

Experiment X.

To an equal Quantity of the octogonal Crystals, and common Tartar powder'd and well mix'd, I applied a red hot Iron, but there ensued no Fulmination or firing.

Experiment XI.

Upon the insipid Earth that remain'd in Filter there was pour'd Oil of Vitriol, and it rais'd a strong Ebullition, and with Syrup Violets turn'd green, and shew'd every Appearance of Alkalescence, upon Application of a Loadstone there were no ferruginous Particles attracted.



Experiments

Experiments producing Phænomena analogous to the Bristol Waters.

Experiment I.

TO one Ounce of unslak'd Lime I pour'd cold Water, instantly there arose little Bubbles from the Lime, and upon Application the Thermometer arose very fast. The Heat was brought as high as possible to that of the Hot-Well, by the Affusion of more Water. Uncalcin'd Limestone produces no Warmth; Nitre, Alum, and all fossile Salts produce Cold.

Experiment II.

Having filter'd the Lime Water, and prepared separate Solutions of Nitre, Roche Alum, and Sea Salt, I first mix'd the Solution of Nitre with the Lime Water and the Transparency continued, then was added the Solution of Sea Salt, and it continu'd unalter'd as before; to another Glas of Lime Water was the Solution of Alum pour'd, and immediately it became milky and precipitated white Flakes. No other Mineral Salt

Salt but Alum can produce this Phenomenon, because it is the only one in which the Acid prevails in a natural State, nor any other but Lime Water.

Experiment III.

With a Solution of Alum and common Salt, the same Experiments were repeated that were made with the filter'd Solution of the Hot-Well Remains, they answer'd in every Trial, particularly with Spirit of Hartshorn and Oil of Tartar *per Deliquium*: This is characteristic to Alum, and can be produced by no other fossile Salt. *

Experiment IV.

To the Solution of Alum and Sea Salt I pour'd the Solution of Quicksilver, and it became milky, but upon adding Lime Water it turn'd yellow as it does at the Hot-Well. This then is another definitive Proof of it's being *Aq. Calcis*. the Water in which an unburnt Limestone taken from the Spot had been laid produced no Alteration.

Experiment

* Et si e saxo aëre & igne, materies aqua solvitur, affusu alcali fixi vel volatilis præcipitatur cum effervescentia.

BOER, de Alumine.

Experiment V.

The Crystals of Alum being examin'd by a Microscope, were found of the same * Figure with those of the *Bristol Water*. To those Crystals of Alum I added Sea-Salt, and then putting them both in a small Retort proceeded as in the ninth Process on the Hot-well Water, the Effect was the same as in the former, nothing came over but true Spirit of Salt: The Alum imparts no Spirit to the Salt, but acts only by Means of its predominating Acid, much like Oil of Vitriol, had this been Nitre instead of Alum the Production would have been an *Aqua Regia*.

Experiment VI.

I put a Crucible into the Fire, in which was first put some Alum, it melted, then dry'd and blister'd, and upon being taken out resembled in every Respect the Salt of the Hot-Well Water, as it was after the eighth Experiment. Had it been † Nitre in the room of Alum, it would have flow'd for ever in the Crucible, and upon cooling would have been a *Sal Prunella*.

* Dat Crystallos albas, vel rubellas, octohedras.

† Nitrum, Crucibulo puro inditum, igne leni funditur totum; sinè Crepitatione, stat fufum in Catino instar aquæ puræ. BOER. de Alumine & Nitro.

Experiment

Experiment VII.

After having mixt equal Quantities of Alum and Tartar well dry'd and powder'd, I put to it a red hot Iron Rod, there was no firing ensued; Nitre mixt with Tartar would have fulminated and become a fix'd *Alcaline Salt*.

Experiment VIII.

To the Earth left after the Evaporation of Lime Water, I added Oil of Vitriol, it excited an Effervescence, and was not to be distinguished in any Respect, or Experiment, from the Earth of the Hot-Well.

From the foregoing Experiments it pretty plainly appears, that instead of Nitre and Limestone Powder with an exceeding subtle Spirit, there is contain'd in the Water Alum and Lime in the Act of Slaking; and from thence only I shall deduce the Cure of a *Diabetes*; and then show if it was Nitre and a Volatile Spirit they would be absolutely mischievous, and if Limestone inefficacious: But before I proceed to account for the Cause of a *Diabetes* and its Cure, I shall advance some Conjectures about the Cause of the Heat, as it arises from Lime in the slaking.

Conjectures

*Conjectures on the Cause of the
Heat of the HOT-WELL
Water.*

BEFORE I begin, I foresee the most material Objection, which is, that naturally there is no Limestone calcin'd, and consequently the Heat must arise from some other Cause; and as that Acid which is every where floating thro' the Earth, resembles Oil of Vitriol, it will, like that Oil meeting with Water, produce Heat; this may be granted, but then the Stream would taste acid, and turn Syrup of Violets red, and the Alum must be in greater Proportion, since here is more alkaline Earth than the Acid can saturate: Which is demonstrated by the alkaline Qualities predominating at the Well. Neither can the Warmth arise from the Solution of the Salts, for all fossile Salts produce

produce Cold in Diffolution, much less can it come from the Attrition of the Water, because that is experimentally known not to affect Water. If in the polishing two Marble Stones you rub one against the other dry, they will conceive an intense Heat, but add the least Water and it is impossible to produce it.

These Objections then being got over, I beg leave to take back my own Sentiments wherever I find them, and endeavour to prove, that it is probable, at some distant Time this Lime Rock was partially calcin'd by a subterraneous Fire, and has supplied the Stream with Warmth ever since.

It must be consider'd at the same Time, that this Subject will admit of no experimental Proof, and whether I succeed or not in the Account of the Cause of the Heat, it has already been definitively proved to be a Lime Water, in which is dissolved Alum and Sea-Salt; but as Natural Philosophy is in great Part but Analogy, and as Probability is equal to Demonstration in all Cases where a down-right Negative without any Support is the Opposition, it may be allow'd me here. To instance, suppose yourself in any Country in which there was not the least Trace of any human Presence
but

but some very antique and ruin'd Architecture, what would you conclude? Why that as those Structures were as far as ever you had observ'd, the Effects of Men, this must be so likewise, the Parallel will hold, for it is as certain that subterraneous Fires have broke Hills asunder, and alter'd the Course of Rivers; and that Fire will burn Limestone according to its Degree and Duration, as that Ruins are the Proofs of human Means: Especially when it is supported by all the collateral Phenomena left after such Convulsions.

Now let us see whether we have Appearance in the present Case to support us. Whoever considers the Situation of the Hot-Well, that it lies between two Precipices, between which also the River runs, will directly imagine that in the Place of this River there was once a continu'd Hill, and that the Chasm was caused by something preternatural and violent. Add the corresponding Inequalities of the Cliffs on each Side, and that the Heat arises from Lime in the Act of slaking, and that naturally there is no Lime without Fire. The Inclination of the River is most evidently thro' the Valley of *Long Ashton*, which leads to the *Severn* Sea, and there is a faint Tradition that it once ran that Way, till

St

St Vincent by cleaving the Rocks form'd the Channel through which it now runs. Those Traditions however Fabulous they may appear, have generally some real Foundations, tho' traced with Difficulty fond amongst the numerous Years that cover them, and obscur'd by the Imaginations of Mankind too apt to run into the marvellous. I should scarce have insisted on this, had it not made this Essay approach nearer to a System, tho' it has at least as great a Probability on it's Side as that *Dover and Calais* were ever join'd, which I have seen very gravely asserted.

Had I contented myself without Experiment, that the Hot-Well Water contain'd Alum and not Nitre *, I should have had an indisputable Authority on my Side, the Sea-Salt which it has is left from the Mixture of the Tide Water.

Of

* Quintus inter fossiles simples sales est acidus, vagus, volatilis, liquidus, forte ubique in fodinis obvius, nec cum Metallis diversa Chalcantia, cum terris calcariis alumina differentia, componit.

BOER. de Alumine.

Comme il y a des eaux minerales qui sont remplies d'une terre Alkaline, & d'un Esprit Vitriolique on peut en retirer de l'alun par l'Evaporation.

Nouveau Cours de Chymie.

Of the DIABETES.

EVERY Disease to which we are subjected must necessarily arise from some Alteration in the Solids or Fluids, a *Diabetes* may arise from either; but I believe the most frequent and most fatal arises from the want of Digestion in the *Primæ Viæ*, or from what may be safely enough call'd the Secondary Digestion in the minuter Vessels. My Meaning will be better understood by what follows. Digestion, I apprehend, is nothing more than preparing the Aliments for a Separation to be made by the Lacteals: Now when this Separation is perform'd, and the secreted Chyle brought into the Blood, there remains another Process of Nature; which is to assimilate the nutritious and throw off the detrimental Particles by the Kidnies and cuticular Glands. For unless the Urinous Salts &c. are secreted, it is no more *Nutrient* in the Blood than it was *Chyle* before it was secreted from the *Fæces*, and this is what is meant by the Secondary Digestion.

It follows now, that a Fault in either of these Functions may be the Source of many Distempers, and as it is universally allow'd that the weakest Part suffers in every Assault, there may be various Diseases from one and the same Cause, according as Constitutions are differently disposed to receive Impressions. Particularly suppose any one has spent a Life gay enough, "*Bottle and Friend too much indulging.*" Upon any Fault in either of the Functions, a Disease will likely enough fall on the Kidnies, as those have been the Glands mostly distended and weakned by frequent use.

It is notorious also, that the continu'd use of spirituous Liquors indurates all Aliments, and stiffens the Fibres of the Stomach. Nay that Spirit of Wine injected into the Arteries of a living Animal, immediately congeals the Serum, impedes Circulation, and Death ensues. This is in some Degree the Case, whenever we indulge too freely in Spirituous Liquors, and at last totally deprives us of Appetite and Digestion. If Digestion then is but illy perform'd in the *Primæ Viæ*, instead of Chyle the Secretion will be crude and imperfect, and consequently the Fault will never be amended when it gets within the Laws of Circulation. Nor will the *Vis Naturæ* of itself avail
to

to separate those Salts by the Kidnies; thence it will result, that thro' want of this Separation there be will no Nutriment assimilated, and an Accumulation of Fluids supervening, the Vessels and Glands are distended, and the Serum, with all the Nutritious Juice, passes off by the Kidnies.

It has been, I know not how, always thought, that a *Diabetes** was a too profuse

E 2

Discharge

* Diuturna est hujus morbi creatio, & longo tempore parturitur in principio os humore privatur, saliva albida est, ac spumans, paulo plus lotii, quam moris erat, effunditur; sitis adest sed nondum vehemens, calefactio parva quidem, sed mordax, visceribus inherens exoritur; habitus corporis gracilis evadit, & homo anxius & animi dubius existit, progressu temporis sitis insigniter augetur, & velox est Carnium & Membrorum in Urinam colliquatio; neque enim cum intermissione lotium reddit, sed, perinde ut canales laxati sint, indefinens est profusio; sitis intolerabilis est, potus copiosus, multitudini tamen lotii non respondens, si parvum tempus a meiando abstinerit, intumescunt lumbi, testes, & ilia, postremo cum dolore meit, & festina mors adventura est. Urinae quidem gustus lenis, & minimè, quantum memini dulcis, paulatim tamen dulcescere in confesso est, quod primùm aquosior. Seri pars affunditur, & postea ipsa seri pars chylosior. Huic autem rei fidem facit, nempe Phthysicorum plurimorum ultimis mensibus insignis spiriti dulcedo, ad Nauseam usque molesta (lac etiam muliebre, a chylo parvulum discrepans, dulcescit.)

LISTERI Sententia.

Succi

Discharge of Urine. But there cannot be a greater Mistake, the Disorder is not from too great a Discharge of Urine, but quite contrary, because there is no Urine at all discharged, but Serum or Chyle in it's Room: For it is scarce possible to secrete too much Urine, or any natural Secretion, but the Danger ever is, when something that is not the true Secretion is carried off. This holds equally true in *Hætic* Fevers, and profuse Sweats, and I shall endeavour to shew that *Hætic* Sweats are thro' the Cuticular Glands, what a *Diabetes* is by the Kidnies.

That what has already been said is the true Cause of a *Diabetes*, will evidently appear from the History of that Malady, as laid down by our best Physicians, and every Symptom is easily deduced from that Original. Whoever will take the least trouble to review the above Quotations, will easily deduce every Symptom from the Cause which has been assign'd before; and must observe that the Cure wholly depends upon bringing back

Succi sanguini illati per vias urinarias crudi & incocti exitum sibi quærent, unde sensim labefactantur vires, colliquescit corpus, & quasi substantia ejus per hanc cloacam exinanitur, cum siti, ardore Viscerum, Lumborum Coxarumque intumescencia, & salivæ spumosæ exspuitione crebra.

SYDENHAMI *Sententia.*

back the true Secretion of Urine, which is no more than separating the animal Salts from the Fluids, and restoring the Strength and Elasticity of the over-distended Fibres.

There remains now that we examine, if Lime in the Act of slaking will separate those urinous Salts, and whether Alum will restore the Tone of the weaken'd Fibres. What the Effects of Lime will be cannot be better seen than by the XCVIIth Experiment of the learned *Boerhaave*, with his Observations of it's Use.

Hence are plainly discover'd the Effects of Lime on animal Fluids, and that it exactly executes what a Medicine must do to cure a *Diabetes*, which is to extricate, and prepare an easy Secretion for the more fixed muriatic Salts sticking in the Blood. Let us now suppose that this Separation of the Salts is brought about, what must be added to finish the Cure? It must be some Medicine which may bring the Fibres into a contractile State, and recover that Elasticity they had lost from too great Distention; that Alum will answer in all this Part is notorious; from it's Astringency it will bring the Stomach into stronger Contractions, and improve Digestion; in the Glands it will lessen the Diameters of the secreting Vessels; in the Arteries it will shorten

shorten their Fibres, improve their Spring, and accelerate the Circulation; and as, according to the Laws of Hydrostatics, Fluids circulating in Tubes have their lightest Parts driven to the Sides, whilst the more heavy are propell'd, the emulgent Arteries lying at right Angles must receive the lightest Parts of the Fluid, and bring it to the Kidnies, which from the aluminous Particles are contracted to let nothing thro' but these Salts dissolved in the aqueous Menstrum, which the Lime had before disengaged.

We can now assign a good Reason for the drinking those Waters warm at the Spring, without being obliged to a Fiction for their Virtues. Since it is demonstrated, that all the salutary Effects arise from the *slaking* Lime, and that after that Action ceases by cooling, it produces no Alteration on animal Solids and Fluids, but as a mere alkaline Earth. The aluminous Part indeed, tho' the same at a Distance as when on the Spot, avails nothing without the previous Separation of the Salts, which can be effected by the *slaking* Lime only.

Let us now examine what would have been the Consequences in the foregoing Indisposition, if the Contents of the Hot-Well had

had been a subtle Spirit, Nitre, and Limestone Powder; if that had been a Spirit it must be a Mineral one, if a Mineral Spirit an Acid one, now all Mineral Acids coagulate the Blood, and hinder Secretions arising from Alcalescence *, Nitre absolutely hinders a Separation of the Animal Salts from an alkaliescent Cause, and is beneficial only when the Juices are in the quite opposite State to that of a *Diabetes*, as in a Pleurisy and all inflammatory Fevers. Limestone, like all other Stone, is absolutely no more than a *Terra damnata* †.

It may be objected here, that, instead of proceeding on *Boerhaave's* Experiment on Urine, I should have tried whether it would have answer'd with the *Bristol Waters*, and if it would not, my Conclusions are all false and supposititious only. Suppose this Objection true, it has a plausible Appearance, yet upon Examination does not stand the Test.

It is certain we can conceive no Alteration by our Senses in any thing, unless it be strong

* Spiritus Vitrioli Sulphurisque paritur cogit in massam constrictam plerumque albescentem.

BOER. CXXVII. *Exp. Sang. Phæ. a acidis, &c.*

† BOER. CXXVIII. *Exp. de Nitro.*

strong enough to create a distinct Perception. The Atmosphere differs in Pressure from the heaviest to the lightest many Degrees, yet I believe no one will say that he feels any Diminution or Increase of Weight in the Alteration, the Reason is because this Alteration is not a sufficient Avocation to the general Attention we must allow the general Atmosphere. Now with Respect to the *Bristol* Water, were it ten times as strongly impregnated with Lime, it would create a very visible Effect in the foregoing Experiment, but tho' it should not as it is, yet it must not be concluded from thence that it is quite inefficacious, we must say notwithstanding that it has every proportional Appearance with the other. Another Instance will better explain my Meaning. You have a Bundle of Straw under your Arm, I take one secretly from you, yet by the strictest Scrutiny of your Eye and Hand you neither perceive the Weight nor Number much lessen'd; but it is lessen'd in both respects, or the Weight is compounded from an aggregate of no Weights, and the Number of no Numbers, which is impossible. Well then, should I repeat the Theft it will at last appear very plain in both Senses, and you were hinder'd from observing it in the first, by what was said of the Atmosphere, the Difference was not great enough to create a distinct Perception, and

and call off your Attention from the greater Weight of the Bundle. The same may be said of the *Bristol Waters*, that tho' it should create no perceivable Alteration at any one time taken singly, yet often repeated it would have the same Effects with the other, but in a slower Way.

From the slight Impregnation of Lime, we may easily deduce it's most salutary Effects, as it's Alterations are silently and mildly carried on, without producing those violent Symptoms which would follow from a larger Quantity, as Fevers, Deliriums, &c. the very same is true as to the Quantity of the Alum.

Of a HECTIC FEVER.

IT has already been mention'd, that the Sweats of a *Hectic* were thro' the Miliary Glands, what a *Diabetes* is thro' the Kidnies; and if we attend diligently, we shall find that, like the *Diabetes*, the Danger in a *Hectic* Fever does not arise from too profuse a Secretion of Sweat, but from the nutritious Particles passing off this way:

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For there is no Instance of a too large Discharge by Sweat, provided it is really that Secretion. Now what has been said with respect to a *Diabetes*, that there can be no Nutriment assimilated, unless the excrementitious Fluids are fecern'd, holds true here, for this Reason, all attempts are vain which endeavour to check those *Hætic* Sweats, without altering the Juices, and generating the natural Discharge. Is it not always observ'd as often as you endeavour to stop those Sweats, if you succeed in that particular, a *Diarrhæa* constantly succeeds, equally fatal as the former Symptom? It has been observ'd by the ingenious Dr *Allen*, that a *Diabetes* and *Ptyalismus* have alternately succeeded the Suppression of each other, and that the Cure of one was the Cure of the other: It is the same in a *Hætic*, if you cure the Sweats you suppress the *Diarrhæa*, but if you only *derive* it from the Glands of the Skin to those of the Intestines, you have not proceeded one Step towards the Patient's Recovery; nor can he possibly recover till he produce the natural Discharges, that the nutritious Particles may be laid aside for the Support of Life, and this seems likely to be effected by the flaking Lime, as in the *Diabetes*; for the Salts of the animal Fluids are the same in every Secretion, and the State of the Fluids the

the same in each Disorder, only the Secretion passes thro' different Emunctories, according as the Constitution is disposed from a particular Texture of the Glands. I need not apply the use of the Alum, because every one will see it's use as plainly here as in the *Diabetes*. There can no Objection arise from the Lime, as if it should produce a putrefact State of the Blood, because then the Salts in the * Experiment on the Urine would have been Volatile Alkalies, whereas it is neither Acid nor Alkali, but quite a-kin to the Human.

What Advantage may not arise from the Use of this *Bristol Water*, if the Patient would apply to them before he is gone beyond the reach of Medicine? Nay, even in the last State of a Pulmonary Consumption I cannot see but it must be serviceable, for it is certain Human Nature cannot be sustain'd without Nutrition, and no Nutrition can be form'd without the previous Separation of the excrementitious Salts: Nor can the Ulcers of the Lungs incarna, unless the true Balsam be brought to them, which I apprehend to be no more than true Nutriment.

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There may be many other Diseases in which it may be beneficial, as in the *Elephantiasis* from a cold Cause, *Chlorosis*, and all *Cachexies*, where the Fluids are too vis-
cous and the Fibres too much relax'd.



OF THE
E F F E C T S
OF THE
W A T E R S
IN
NEPHRITIC DISORDERS.

IT has of late been an Objection to the *Bristol Waters*, that upon the Use of them they have increased the Gravel in those Subjects liable to that Complaint, and for that Reason not to be drank safely by such Persons. A stricter Attention, and a fair State of the Case will set the Matter in a quite opposite Light.

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It has been found by some subject to Nephritic Complaints, that at their first coming to the Well and drinking the Waters, the Paroxysms have oftner succeeded each other, and with more Violence than before, and thence they have concluded that the Waters increase these Disorders: But how unjust is this when we consider that the Pain is not the Disease, but a Consequence of it's passing off by Means of Medicine, or the Efforts of Nature throwing off the already generated Concretions. Suppose any Quantity of Gravel lodg'd in the Basen of the Kidnies, is it not manifest that Pains must succeed upon it's remoyal from thence thro' the Ureters into the Bladder? And is it not equally certain, that whatever promotes the dislodging this Gravel from the Kidnies is a salutary Medicine? And the more efficacious it is, the oftner the Paroxysms will follow each other, till the whole is brought away? This is directly the Case in the Hot Well Water, and seen in this true Light removes the Objection.

Now let us see whether our Theory will not vindicate this Fact. Every one allows that Nephritic Diseases arise from some Fault in the Urinary Secretion; it has been already experimentally observ'd, that *slaking Lime* produces that true Secretion; hence it follows that no Alterative can be more successfully

cessfully pursued than this Medicinal Water, since it washes off the already concremented Gravel, and hinders it from being generated a-new, by producing the genuine Discharge.

It does not belong to me to say what Medicine or Diet is best adapted in each Case with these Waters, whatever Physician shall have the Care of those that drink this Medicinal Water, will inform them in these and many other things, altogether beyond any thing that can be said by me.

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usually pursued, however, the Water
it is watered off the already condensed
steam, and it is then being generated
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